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INDUSTRIAL APPLICATION OF TAPIOCA (CASSAVA)
FOR MANUFACTURING OF TAPIOCA MACARONI
OR TAPIOCA-RICE

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Industrial application of Tapioca (Cassava) for manufacturing of Tapioca Macaroni or Tapioca Rice

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SUMMARY

a) Remarks of scientific development and justification in relation of the nutrition

The Indian national leaders as also Government authorities are anxious that the country should not only produce more foodgrains but also make better use of various other forms of food materials that are nutritionally valuable but have not yet been adequately utilised. There are also certain high yielding crops, which, if produced on a larger scale and properly utilised can help to cover the present deficiency.

The development of Tapioca Macaroni by the Central Food Technological Research Institute and a Swiss Manufacturer is a significant accomplishment of concerted effort in the production of a clean, wholesome article of food. Both quantitatively and qualitatively it satisfies scientific standards and technological requirements.

Tapioca is a root crop (Cassava *Manihot utilisima*) which yields several times as much starchy food per acre as the cereal crops, (e.g. 3-4 times as much starch per acre as rice), which are also more expensive to produce and require more attention. By itself, Tapioca is an incomplete food, and needs to be enriched with body-building proteins. To produce the desired composition, small percentage of specially prepared groundnut flour and wheat semolina (Soji) have been added to Tapioca flour and the mixture scientifically processed so as to yield products which can be cooked and consumed in the same or similar way as foodgrains or standard Macaroni products.

The resulting product contains about 10% protein, twice as much as rice, besides the requisite quantities of minerals and vitamins. Tapioca Macaroni, this low-cost and nutritious new staple food is wholesome and contains no dirt, stone or other foreign matter.

It cooks within five or eight minutes as compared to rice which takes nearly half an hour and may be used in the same way as rice or for the preparation of different dishes.

b) The Preparation of the Raw Material

1) Tapioca flour

It is prepared from white, dry chips obtained from the Tapioca tuber after removing both its outer skin and the inner rind.

Tubers are rich in starch and contain adequate quantities of minerals like calcium, but are very deficient in protein, as the following composition of fresh Tapioca tubers will illustrate:

- Moisture	59,4%	Phosphorus	0,04%
- Protein	0,7%	Iron	0,9 mg
- Fat	0,2%	Vitamin B	0,045 mg
- Mineral matter	1,0%	Nicotinic Acid	0,7 mg
- Carbohydrate (Starch)	38,7%	Riboflavin	0,04 mg
- Calcium	0,05%	Vitamin C	0,24 mg

2) Groundnut flour

The damaged and shrivelled kernels of the decorticated groundnuts as obtained from the decorticating machine so as grit and stones etc. are sorted out by means of a shaker fitted with sieves of different mesh size. This separation is based on size grading. The clean kernels are given a light roast in a roaster of the type used for roasting coffee or cocoa beans. The heated kernels are then cooled and the red cuticle removed by mechanical scrubbing in a blanching equipment similar to one used in the manufacture of peanut butter. The detached cuticle and the germ are separated out by a current of air. It is very necessary to remove the cuticle as, otherwise, it will impair the colour of the flour and also the final product. Great care should be taken to avoid contamination of the kernels with any grit or sand. The decuticled kernels are re-examined for removing any residual defective pieces. The clean kernels are then pressed in a conventional oil-exPELLER to obtain oil and press-cakes containing the minimum amount of residual oil (max. 5-6%). The humidity content is about 8%. The press-cake is ground in a hammer mill and the obtained flour contains nearly 50% protein.

3) Wheat semolina (Soji)

The wheat is to be milled in such a degree of fineness that 100 percent pass through 32 mesh. The Swiss Manufacturer is since 100 years builder of roller mills and is prepared to quote for most modern and economic complete plants for soft and hard wheat, and for any desired capacity.

c) Dry Mixing of Ingredients

A substantial part of the Tapioca Macaroni plant consists in the blending and mixing arrangement.

The raw materials are blended in the following proportion: Tapioca flour 60%, groundnut flour 15% and wheat 25%. The average moisture content of the ready mix is 10 to 11% of which about 1,1 tons are necessary to produce 1 ton of finished Tapioca Macaroni.

d) Production of Tapioca Macaroni

A complete continuous production line consists of:

- 1) An extrusion press
- 2) A predryer
- 3) A belt drying unit

e) Nutritive value, ingredients and shapes of product

The nutritive value of Tapioca Macaroni is about twice as high as natural rice. The composition is as follows:

- Moisture	11,0%	Calcium	0,05%
- Protein	10,5%	Phosphorus	0,14%
- Fat	1,9%	Iron	2,90 mg/100 gr
- Ash	1,8%	Thiamine	0,22 mg/100 gr
- Fibre	0,7%	Nicotinic Acid	3,70 mg/100 gr
- Carbohydrates	73,8%	Riboflavin	0,07 mg/100 gr

It is an important fact that Tapioca Macaroni products contain large quantities of protein, calcium and vitamins.

Unlike naturally grown grains as rice, wheat etc., Tapioca Macaroni is an extremely clean product. It doesn't contain any foreign matter and is 100% food easily digestible and will benefit particularly growing children.

And never forget that 75% of the raw material used for the preparation of this new and very nutritious staplefood is produced by indigenous agriculture.